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## No. IV.

## BITING-IN ON STEEL PLATES.

*The* GOLD ISIS MEDAL *was this session presented to Mr. W.* COOKE, *Jun. 5, Seymour-street North, Clarendon-square, for his improvements in Etching on Steel Plate. The following communication has been received from him on the subject.*

5, Seymour-street North, Clarendon-square,
December 21, 1825.

SIR,

As the Society of Arts have given a portion of their attention to the subject of engraving on steel plates, and as many experiments have failed, I feel great pleasure in making the following communication public through the medium of the Society.

For the best mode of biting-in, hitherto published, we are indebted to the great perseverance of Mr. Turrell; but the difficulty and danger of using his menstruum on a soft ground, or when the varnish is not sufficiently dry, induced me to use the acids in different proportions, and to leave out the alcohol, as the composition was found to act on the ground, causing the whole surface of the plate to be corroded; this has frequently happened.

It is necessary to mention, that all plates for landscape engraving should be made of steel, not completely decarbonized.

I beg to submit a few preparatory directions previous to etching.

The steel should be carefully cleansed (before laying the ground) with turpentine only, omitting the whiting which is used in preparing the surface of copper.

The ground should be laid with as little heat as possible, steel needing not so much as copper; too high a temperature decomposes the ground, and occasions it to produce small air bubbles, or to evaporate in a light smoke from the surface of the plate; should this take place, the ground must be re-laid. It is also highly necessary that in etching the point should penetrate the surface of the steel, and the breath not be suffered to condense on the etching, as it will cause the lines to rust, and will prevent the acid from biting well. The plate being ready for biting-in, the process is as follows:—mix, by gentle shaking, six parts of acetic acid, and one part of nitric acid.

This mixture, being very rapid in its action, should be taken off the plate at half a minute, and the acid well washed out of the lines with water, drying the plate well, but without the assistance of heat. Stop out the light tints with Brunswick black varnish; and then, for the purpose of washing the oxyd out of the lines, pour on the plate a mixture of six parts of water and one of nitrous acid, letting it remain two or three seconds; take this off, and immediately repeat the former mixture without washing the plate between with water. This process should be repeated for each tint.

The biting-in of a steel plate should be accomplished, if possible, in one day: this observation holds good in regard to other methods of biting, as the lines will sometimes attract oxygen from the atmosphere during the night, which will prevent their biting with the same degree of clearness as the day before.

When the biting is completed, and the ground taken off, with a strong tooth-brush and turpentine, clean out the remaining oxyd from the lines, using the fingers for the light tints; then rub the surface of the plate, to remove the bur, with the finest emery paper previously well used on the back of a steel plate to take off its roughness; the more this paper is used the more valuable it becomes for taking out the marks of the scraper from dry point tints.

Re-biting is performed by dipping a clean rag in a very dilute nitric acid, and rubbing it over those parts intended to be re-bitten until the surface becomes dull; clean the plate out as before-mentioned, and in laying the ground the dabber should be used but little, as it is likely to take up the ground again; re-bite with a few drops of nitrous acid in four ounces of water, sufficient to make the water taste sharply of the acid.

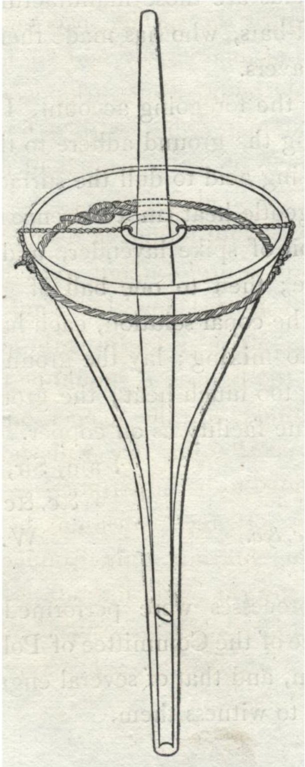
The whole process for biting, or re-biting, should be performed in a temperature of about sixty degrees, or higher, and certainly not much below that point.

As the time required to bite-in is the principal thing to be observed, all the light tints should be tried every minute after the first biting; but the deeper ones will require a longer time. A little practice will show these remarks (apparently trifling) to be important.

Biting on very soft steel plates may be accomplished by using the following mixture:—three ounces of warm water, four grains of tartaric acid, four drops of nitric or sulphuric acid, one drachm of corrosive sublimate.

I also submit to the Society a new method of gradating skies and other tints.

Incline the plate, by tilting it with a wedge, and pour the re-biting acid into a glass funnel with a stick inserted in the tube, and kept steady by a twisted cord and ring, as shown in the figure below; drop the acid on the dark part, and according to the colour of the tint the acid should be made to drop faster or slower, which is regulated by the stick in the centre, and gives to the acid a tremulous motion, until it is floated over the whole sky; this obviates the old method of sweeping or feathering, which, from the quick action of the acid, occasions streaks to appear in the tints when the ground is taken off.



It is important that engravers should make use of the best acids, and perfectly free from adulteration. From the cheapness of sulphuric acid it is sometimes used with muriatic, to adulterate the nitric acid. The following tests will discover them:—dissolve a little nitrate of barytes in distilled water, and add it to a small quantity of the nitric acid in a phial or test tube; if a white precipitate is discovered at the bottom sulphuric acid is present; and muriatic acid will form, with a solution of nitrate of silver, a white cloudy precipitate; should either of these effects take place, the acid is not fit for use.

The purest acids are those manufactured by Mr. Remnant, Smithfield-bars, who has made them some years for the use of engravers.

Since writing the foregoing account, I have discovered means of making the ground adhere to the surface of the steel, without using acid to dull the surface.

Dissolve, by gentle heat (in a Florence flask), some powdered copal in oil of spike lavender, and evaporate to a thick consistence; then to one ball of ground add about one drachm of the copal solution, each having been made warm previous to mixing; lay the ground as before mentioned, avoiding too much heat; the ground may then be laid with the same facility as on copper.

I am, Sir,
&c. &c. &c.
W. Cooke, Jun.

*A. Aikin, Esq.*
*Secretary, &c. &c.*

The above processes were performed on tinted steel plates in presence of the Committee of Polite Arts, to their entire satisfaction, and that of several engravers, who were specially invited to witness them.